

# ORGANIC CHEMISTRY

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*by*

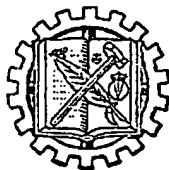
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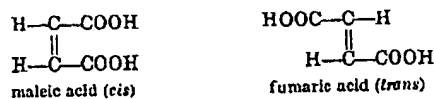
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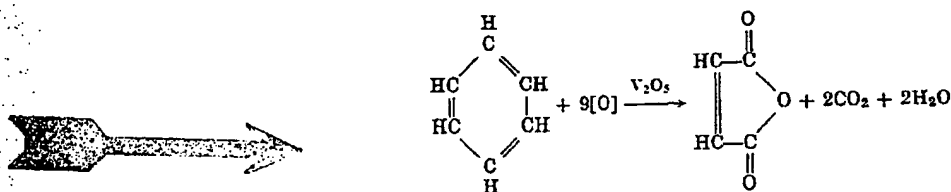
The Dieckmann condensation of diethyladipate gives a cyclopentanone derivative (Section 41.3c).

#### 41.8 UNSATURATED ALIPHATIC DIBASIC ACIDS

a. Maleic acid and fumaric acid. These acids are geometric isomers of 1,2-ethenedicarboxylic acid.



Maleic anhydride is prepared by passing benzene vapor and air over vanadium pentoxide at 400–500°.



The anhydride may be hydrolyzed to maleic acid by heating it with water. Maleic acid melts at 130–130.5°; at 160° and above it is converted to the anhydride. Maleic acid is a stronger acid than fumaric acid and is quite soluble in water.

Fumaric acid occurs free in many plants. It does not melt, at atmospheric pressure, but sublimates at about 200°. Fumaric acid is difficultly soluble in water and is somewhat more stable than the *cis* form. It does not form a corresponding cyclic anhydride because the carboxyl groups are too far apart. At temperatures of 250–300°, fumaric acid undergoes isomerization and loss of water to form maleic anhydride.

When a concentrated solution of maleic acid in hydrochloric acid is heated, isomerization takes place and the less soluble fumaric acid separates. In this isomerization, the double bond must become a single bond temporarily so that rotation may occur.

